

# Inspection, Repair and Leak Detection

## Technical Track 3

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# Leak Detection

- How significant is the problem?
  - Is this a fugitive emissions issue for natural gas?
  - Are the problems facility oriented vs. ROW?
- Manage the perceptions
  - Include regulators in technologies development process
  - EPA and industry disagree on severity of problem
- R&D should consider differences for
  - Natural gas, liquids and LDCs
  - Pipelines vs. facilities
- Technologies for real-time monitoring and detection of small leaks

# Leak Detection

## ■ For Natural Gas Transmission

- Low priority issue for transmission in rural areas
- Cost issue rather than technology issue
- Could be used in conjunction with aerial patrols

## ■ For LDCs

- Hand-helds are useful and commercially available
  - *improve resolution/reliability*
- Pinpointing leak location
- Definition of leak migration patterns

# Leak Detection

## ■ For Liquids Lines

- Fly over device to detect hydrocarbons
- Potential gap offshore at connectors
- Device vs. analytical techniques
- API/AOPL study indicates smaller leaks most often occur in facilities

# Sensor Technology

- Understanding Performance Characteristics and Limitations
  - Need to develop clear understanding of sensor capabilities with respect to different materials, sensor package, pipe geometry/cleanliness
  - What are nominal expectations for each of the technologies, and across all vendors
  - How can more precise measurements from subsequent inspections and in-ditch verifications be used to “close the loop” on performance of tools?

# Sensor Technology

## ■ Unpiggable Lines

### – Robotic platforms

- Improved power generation

- Improved communications with robots

- Lighter sensors and sensors with reduced power requirements

- Integrated platform/sensor package development

### – Clear definition of performance expectations

### – Guidelines/necessity to clean pipes prior to inspection

- What tools are available for cleaning unpiggable lines?

# Sensor Technology

- Detection of Cracks/SCC
  - In-ditch methods for finding and sizing SCC
- Cased Pipes
- Small Diameter Lines
  - Are inspection pigs needed?
  - What minimum size should be investigated?
- New Technologies are Needed
  - For unpiggable lines; e.g., pig on a stick
  - For patched pipe
  - For non-metallic materials
- Apply existing technologies from exploration and production sector
- Maximize data acquisition

# Mechanical Damage

- What are immediate needs?
  - Screening and ranking tools for decision-making
  - Guidance to make life predictions and prioritize maintenance operations
  - Tools to locate and quantify all parameters needed for assessment models
    - Severity assessment
    - Guidance on acceptable levels of damage
  - Methods to locate and repair damage in difficult to inspect areas

# Mechanical Damage

- Need to develop acceptable definitions for
  - Cracks
    - No guidance exists for definition of cracks – significant vs. microcracks
    - Can quantitative models of damage assist development of definitions?
  - Ripples/wrinkles
- Inspection tools need to consider variations in steel grade and non-metallic materials

# When to Repair

- Primary need is to transfer technologies to practices and implement in standards to influence regulatory activities as quickly as possible
  - Technologies to address accurate corrosion rate determination to quickly address intervals
  - Post ILI calibration technologies to address intervals
- What is the technology needed to support repair decisions?
- How do you mine existing datasets to learn from and provide practical guidance?

# How to Repair

## ■ Composite Repair Systems

- Guidance is needed to assist industry in the selection of proper repair systems for a given set of conditions
- Can a tracking database be developed that summarizes current techniques?
- Is a state of industry report needed?

## ■ What are drivers for repair selections?

- Cost
- Disruption of service
- Safety

# Needs Summary

## ■ Leak Detection

- Assessment of significance of problem
- Manage perceptions
- New technologies for real-time monitoring and detection of small leaks
- For LDCs, develop hand-helds and methods for pinpointing location and migration patterns
- For liquids, develop fly-over devices, and assess needs for new technologies vs. analytical model developments
- Technologies for use in offshore operations

# Needs Summary

## ■ Sensor Technology

- Develop improved understanding of performance characteristics
- For unpiggables,
  - Improved power and communications and/or lighter sensors
  - Integration of platform and sensor package design
  - Guidelines for cleaning
- In-ditch methods for SCC characterization
- Methods for inspecting cased pipes
- Assess needs for new technologies
  - Inspection of non-metallics
- Considerations for small diameter pipelines
- Methods/techniques to maximize data acquisition

# Needs Summary

## ■ Mechanical Damage

- Develop tools for screening and ranking
- Develop methods of inspection and assessment for quantitative life predictions
- Identify methods to locate and repair damage in difficult to inspect areas
- Develop proper definitions for cracks and other damages
- Design tools to inspect pipes of various steel grades and non-metallics

# Needs Summary

## ■ When to Repair

- Need to transfer technologies to industry to influence standards and regulatory activities
- Identify technologies needed to support repair decisions
- Investigate how to mine existing datasets with goal of providing improved industry guidance

# Needs Summary

## ■ How to Repair

- Guidance on proper selection of composite and other repair techniques
  - Tracking database
  - State of industry report
- Consider drivers for selection of repair technologies